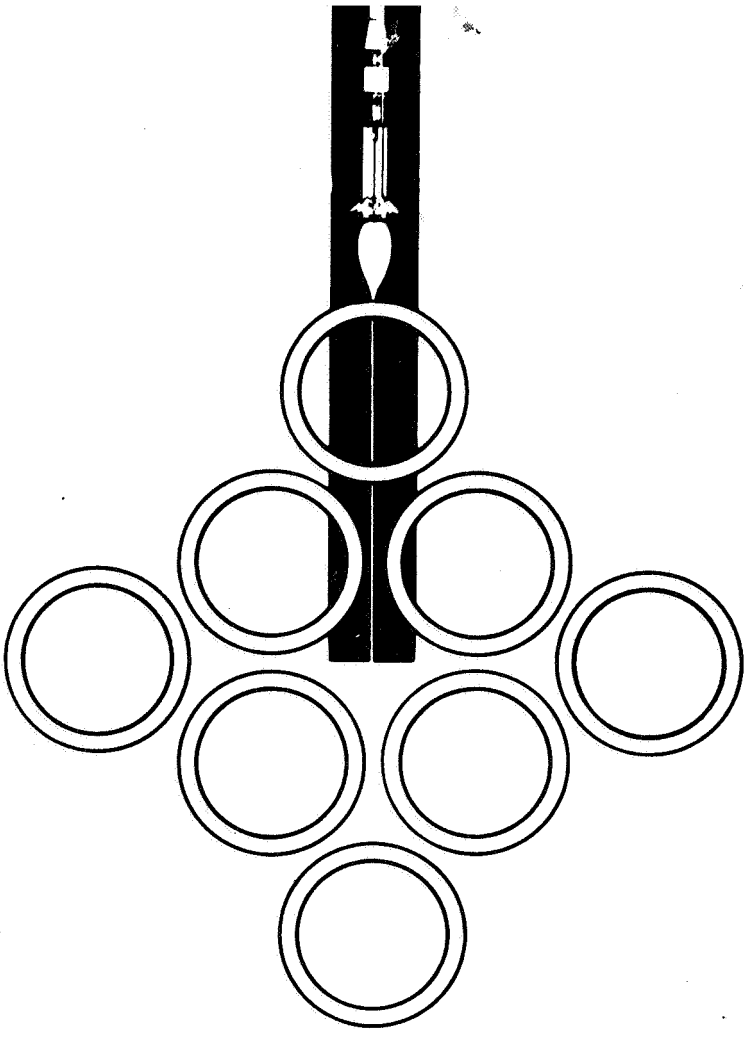

ENGINEERING DEPARTMENT

TECHNICAL REPORT

TR-RE-CCSD-FO-1094-3

March 15, 1967

SATURN IB PROGRAM

TEST REPORT
FOR

GATE VALVE, MANUALLY OPERATED

6-INCH, 150-POUND

Pacific Valve Company Part Number S8550F(8)-12T-ASA

NASA Drawing Number 75M12930 LGV-IB

SPACE DIVISION CHRYSLER CORPORATION

TEST REPORT

FOR

GATE VALVE, MANUALLY OPERATED

6-INCH, 150-POUND

Pacific Valve Company Part Number S8550F(8)-12T-ASA

NASA Drawing Number 75M12930 LGV-IB

ABSTRACT

This report presents the results of tests performed on one sample of manually operated Gate Valve 75M12930 LGV-IB. The following tests were performed:

1. Receiving Inspection
2. Proof Pressure
3. Functional
4. High Temperature

The results of the tests performed were satisfactory. The performance of the specimen was in accordance with specification requirements of NASA drawing 75M12930 LGV-IB.

Testing of manually operated Gate Valve 75M12930 LGV-IB was discontinued after high temperature test. Due to a material compatibility problem encountered at the John F. Kennedy Space Center on the subject valve, the manufacturer has recommended certain design modifications.

TEST REPORT

FOR

GATE VALVE, MANUALLY OPERATED

6-INCH, 150-POUND

Pacific Valve Company Part Number S8550F(8)-12T-ASA

NASA Drawing Number 75M12930 LGV-IB

March 15, 1967

CHRYSLER CORPORATION SPACE DIVISION - NEW ORLEANS, LOUISIANA

FOREWORD

The tests reported herein were conducted for the John F. Kennedy Space Center by Chrysler Corporation Space Division (CCSD), New Orleans, Louisiana. This document was prepared by CCSD under contract NAS 8-4016, Part VII, CWO 271620.

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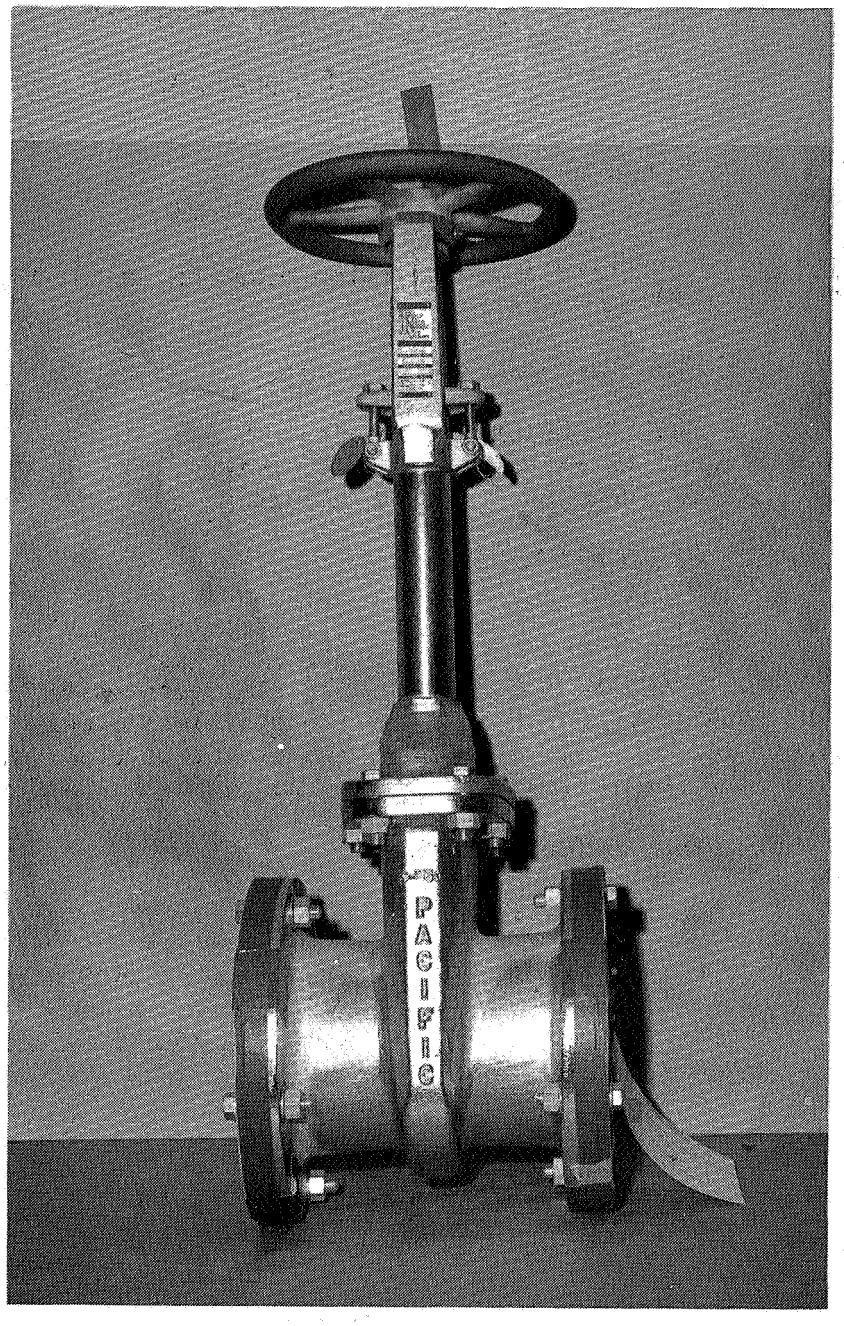


Gate Valve, Manually Operated 75M12930 LGV-IB

CHECK SHEET

FOR

GATE VALVE, MANUALLY OPERATED

6-INCH, 150-POUND

MANUFACTURER: Pacific Valve Company
MANUFACTURER'S PART NUMBER: S8550F(8)-12T-ASA
NASA PART NUMBER: 75M12930 LGV-IB
TESTING AGENCY: Chrysler Corporation Space Division, New Orleans, Louisiana
AUTHORIZING AGENCY: NASA KSC

I. FUNCTIONAL REQUIREMENTS

A.	OPERATING MEDIUM :	LN_2
B.	OPERATING PRESSURE:	150 psig
C.	PROOF PRESSURE:	225 psig

II. CONSTRUCTION MATERIAL

A.	BODY:	316 stainless steel
B.	BONNET:	316 stainless steel
C.	VALVE TRIM:	316 stainless steel
D.	YOKE:	316 stainless steel
E.	DISCS:	316 stainless steel with Teflon inserts
F.	END CONNECTIONS:	6-inch, 150-lb ASA flanges

III. ENVIRONMENTAL REQUIREMENTS

OPERATING TEMPERATURE:	-320 to +125°F

IV. LOCATION AND USE: Used as a shutoff valve in the LOX fill system at John F. Kennedy Space Center Launch Complexes 34 and 37B.

TEST SUMMARY

GATE VALVE

75M12930 LGV-IB

Environment	Units	Operational Boundary	Test Objective	Test Results	Remarks
Receiving Inspection	1	Visual examination	To determine if specimen conforms with applicable drawings and specifications	Satisfactory	Length : 10-½ inches flange to flange Height: 37 inches
Proof Pressure Test	1	225 psig for 5 minutes	Check for leakage and distortion	Satisfactory	Maintained 225 psig. No external leakage
Functional Test	1	Maximum allowable leakage 10 sccm	To determine specimen internal and packing gland leakage	Satisfactory	Internal leakage: none Packing gland leakage : none
High Temperature Test	1	Stabilize specimen at 125°F for 72 hours; perform functional test both at high temperature and after return to ambient conditions	To determine operating ability at high temperature and after return to ambient conditions	Satisfactory	No change of operation ability. No increase in leakage during functional tests
Surge Test	0	50 to 150 psig within 100 milliseconds for 20 cycles	To determine if specimen operation is impaired by surge		Test not conducted
Cycle Test	0	Open and close the specimen while the specimen is pressurized to 300 psig. Perform 500 cycles	Perform a functional test after 100, 200, 300, 400, and 500 cycles. Check for leakage		Test not conducted
Burst Test	0	600 psig for 5 minutes	Maintain 600 psig with no leakage for 5 minutes		Test not conducted

SECTION I

INTRODUCTION

1.1 SCOPE

This report describes the results of tests that were performed to determine if Gate Valve 75M12930 LGV-IB meets the operational and environmental requirements of the John F. Kennedy Space Center. A summary of the test results is presented on page vii.

1.2 ITEM DESCRIPTION

1.2.1 Gate valve 75M12930 LGV-IB is a manually operated, 6-inch, flanged end gate valve. The valve is manufactured by the Pacific Valve Company, Long Beach, California and serves as a shutoff valve in the LOX fill system.

1.2.2 The valve is of a one piece pattern and has an integral seat. The valve also has an extension bonnet, and an outside screw and yoke. The valve control handle is of the hand wheel type. The valve measures 10 $\frac{1}{2}$ inches face to face. Construction is of 316 stainless steel with a Teflon insert in the downstream valve disc. The upstream valve disc is bronze.

1.3 APPLICABLE DOCUMENTS

The following documents contain the test requirements for gate valve 75M12930 LGV-IB.

a. KSC-STD-164(D), Standard Environmental Test Methods

b. Drawing 75M12930 LGV-IB

c. MSFC Cleaning Standard MSFC-STD-164

d. Test Plan CCSD-FO-1094-1F, Rev. A

e. Test Procedure TP-RE-CCSD-FO-1094-2F

SECTION II

RECEIVING INSPECTION

2.1 TEST REQUIREMENTS

The specimen shall be visually and dimensionally inspected for conformance with the applicable specifications prior to testing,

2.2 TEST PROCEDURE

A visual and dimensional inspection was performed to determine compliance with NASA drawing 75M12930 IGV-IB and the applicable vendor drawing to the extent possible without disassembly of the test specimen. At the same time the test specimen was inspected for poor workmanship and manufacturing defects.

2.3 TEST RESULTS

The specimen successfully complied with the requirements of NASA drawing 75M12930 IGV-IB and the vendor drawing. No evidence of poor workmanship or manufacturing defects was observed.

2.4 TEST DATA

The data presented in table 2-1 were recorded during receiving inspection.

Table 2-1. Specimen Specifies

Name	Gate Valve, Manually Operated
Size	6-inch
Figure No.	S8550F(8)-12T-ASA
Material	Stainless steel
Height	37-inches
Length	10 ½-inches (flange to flange)
End Connections	6-inch, 150 pounds ASA flanges

SECTION III

PROOF PRESSURE TEST

3.1 TEST REQUIREMENTS

3.1.1 With the test specimen in the open position, the inlet and outlet ports shall be simultaneously pressurized to 225 psig. This pressure shall be maintained for 5 minutes.

3.1.2 The test specimen shall be checked for leakage and distortion.

3.1.3 The test medium shall be H_2O.

3.2 TEST PROCEDURE

3.2.1 The test setup shown in figures 3-1 and 3-2 was assembled using the equipment listed in table 3-1.

3.2.2 It was determined that all connections were tight, the gage was installed and operating properly, and that all valves were closed.

3.2.3 The specimen was placed in the opened position and valves 4 and 6 were opened. The specimen and system were purged of air by operating hand pump 3.

3.2.4 Valve 6 was closed and hand pump 3 was operated until the specimen was pressurized to 225 psig. The pressure was monitored on gage 5.

3.2.5 Valve 4 was closed and the pressure was maintained for 5 minutes.

3.2.6 During the 5-minute pressurization period, the specimen was checked for leakage by monitoring gage 5, and by visual inspection. The initial and final pressures were recorded

3.2.7 Valves 4 and 6 were opened and the system was allowed to depressurize to zero psig,

3.2.8 The specimen was inspected for distortion and all data were recorded.

3.3 TEST RESULTS

3.3.1 The test specimen was successfully subjected to the proof pressure test, No leakage or distortion was noted,

3.4 TEST DATA

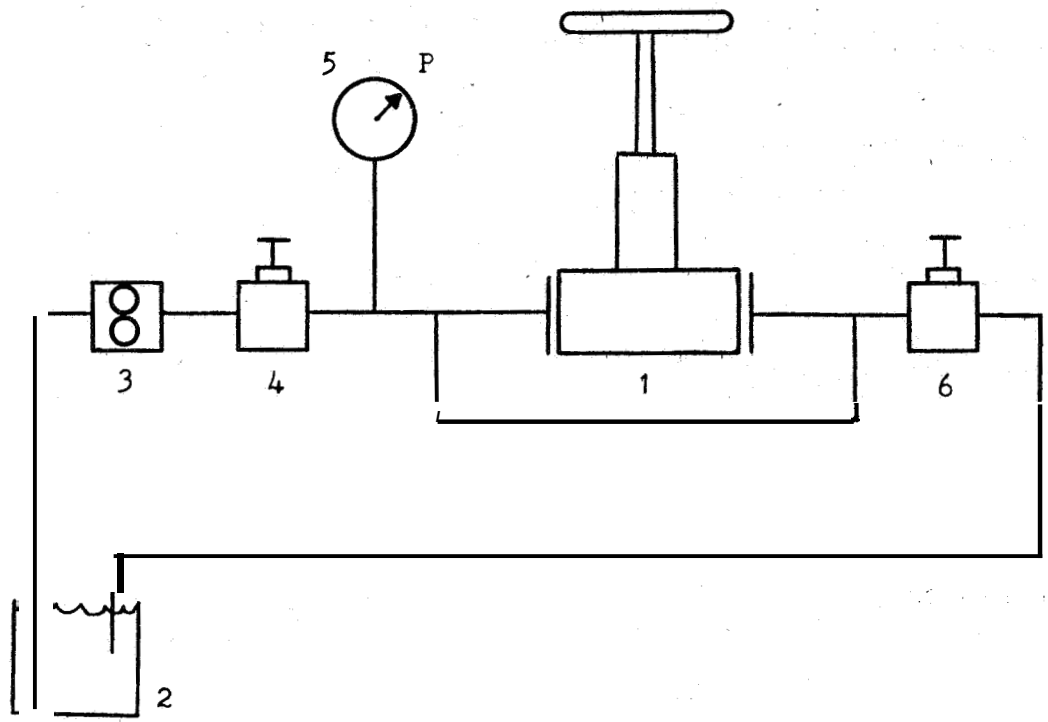
Tie data recorded during the proof pressure test are presented in table 3-2.

Table 3-1. Proof Pressure Teat Equipment List

Item No.	Item	Manufacturer	Model/ Part-No.	Serial No.	Remarks
1	Test Specimen	Pacific Valve Company	S8550F(8) -12T-ASA	MA	6-inch gate valve
2	H_2O Reservoir	CCSD	NA	NA	
3	Hand Pump	Sprague Engineering Corporation	NA	300-16-64	5000-psig
4	Hand Valve	Robbins Aviation	SSKE 250-4T	NA	¼-inch
5	Gage	Duragage	NA	109-1001	0-to 500-psig ±0.5% FS accuracy
6	Hand Valve	Robbins Aviation	SSKG-250-4T	NA	Cal date 4-9-67 ¼-inch

Table 3-2. Proof Pressure Test Data

Test Media	H_2O
Pressure	225 psig
Duration	5 minutes
Leakage	None
Distortion	None



Note: All lines are 1/4 inch.
Refer to table 3-1 for item identification.

Figure 3-1. Proof Pressure Test Schematic

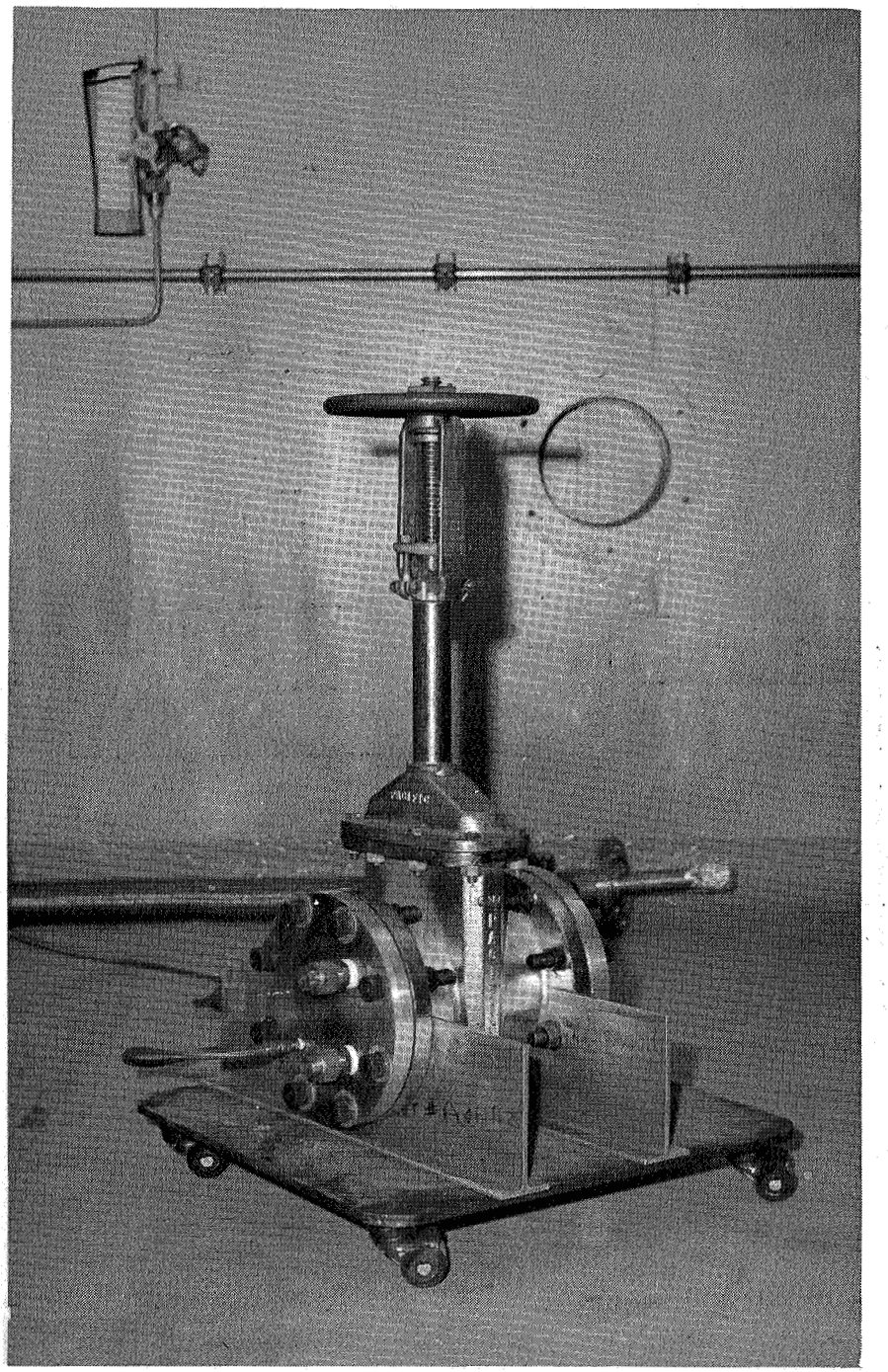


Figure 3-2. Proof **Pressure Test** Setup

SECTION IV

FUNCTIONAL TEST

4.1 TEST REQUIREMENTS

4.1.1 The test specimen shall be opened and closed five times while pressurized to 150 psig with LN_2.

4.1.2 The test specimen shall be checked for internal leakage while pressurized to 150 psig with LN_2. The maximum allowable leakage shall be 10 sccm per inch of seat diameter.

4.1.3 The packing gland shall be checked for leakage for 30 minutes while the specimen is open and pressurized to 150 psig with LN_2.

4.2 TEST PROCEDURE

4.2.1 The test setup was assembled as shown in figures 4-1 and 4-2 using the equipment listed in table 4-1. The test specimen was closed.

4.2.2 It was determined that all connections were tight, that gages were installed and operating properly, and that all valves were closed.

4.2.3 Hand valve 5 was opened and the, 3000-psig supply pressure was monitored on pressure gage 6,

4.2.4 LN_2 tank 10 was pressurized to 150 psig by adjusting regulator 7. The LN_2 tank pressure was monitored on pressure gages 8 and 11.

4.2.5 Hand valves 12 and 18 were opened and hand valve 16 was slightly opened. The test specimen was allowed to cool. The test specimen inlet pressure was maintained at 150 psig by adjusting regulator 7. The test specimen inlet pressure was monitored with pressure gage 13.

4.2.6 When thermometer 14 indicated the presence of LN_2 in the test specimen, the test specimen was slowly opened. The test specimen was opened and closed five times.

4.2.7 Hand valves 12 and 18 were closed and hand valve 15 was opened. All the LN_2 was drained from the specimen outlet, Flowmeter 17 was connected as shown in figure 4-1 (view A),

4.2.8 LN_2 boiloff was monitored by observing flowmeter 17. The presence of boiloff was evidenced by a flowmeter indication when the specimen inlet pressure was zero psig.

4.2.9 When the boiloff ceased, hand valve 12 was opened, The test specimen inlet pressure was maintained at 150 psig by adjusting regulator 7.

4.2.10 When thermometer 14 indicated the presence of LN_2 in the test specimen inlet, leakage from the test specimen outlet was checked for 5 minutes. Leakage was indicated by flowmeter 17. The maximum allowable leakage was 10 sccm per inch of seat diameter.

4.2.11 Flowmeter 17 was disconnected from the outlet of hand valve 15. Hand valve 15 was closed and hand valve 18 was opened,

4.2.12 The test specimen was opened slowly. The entire specimen was allowed to fill with LN_2. The specimen pressure was maintained at 150 psig.

4.2.13 While thermometer 14 indicated the presence of LN_2 in the test specimen, leakage from the packing gland of the specimen was checked for 30 minutes. A soap solution was used to check for leakage.

4.2.14 For the initial functional test, the procedures described in' 4.2.1 through 4.2.13 were performed as necessary to obtain consistent data. For all subsequent functional tests, the procedures were performed once.

4.3 TEST RESULTS

The specimen successfully completed the functional test.requirements. No leakage was recorded.

4.4 TEST DATA

Data recorded during the functional test are recorded in table 4-2.

Table 4–1. Functional Test Equipment List

Item No.	Item	Manufacturer	Model/ Part No.	Serial No.	Remarks
1	Test Specimen	Pacific Valve Co.	S8550F (8)-12T-ASA	NA	Gate valve, 6-inch, 150-pound
2	GN_2 Source	CCSD	NA	NA	3000-psig
3	Pressure Gage	Ashcroft	1057	NA	0–to 5000-psig ±1.0% FS accuracy
4	Filter	Bendix	5-S-13460-16-B-0	NA	10-micron
5	Hand Valve	Vacco	NA	5116-13	1-inch
6	Pressure Gage	Duragage	NA	109-1001	0–to 5000-psig ±1.0% FS accuracy Cal date 10-13-66
7	Regulator	Tescom	26-1101-162	NA	0–to 500-psig outlet 0–to 5000-psig inlet
8	Pressure Gage	Duragage	MA	109-1004	0–to 500-psig ±0.1% FS accuracy Cal date 10-13-66
9	Relief Valve	Anderson-Greenwood	81-B-66-0	NA	220-psig
10	LN_2 Tank	Convair-Astronautics	27-29501-803	104898	
11	Pressure Gage	Marsh Instruments	NA	95-1145	0–to 500-psig ±1.0% FS accuracy Cal date 10-23-66

Table 4–1. Functional Test Equipment List (Continued)

Item No.	Item	Manufacturer	Model/ Part No.	Serial No.	Remarks
12	Hand Valve	Hydromatics	NA	NA	1-inch 400-psi, water or gas
13	Pressure Gage	Marsh Instruments	NA	95-1149B	0–to 500–psig ±0.1% FS accuracy Cal date 10-14-66
14	Thermometer	Honeywell	NA	640710 99	-300 to +400°F ±1°F accuracy
15	Hand Valve	Hydromatics	NA	NA	1-inch 400-psi, water or gas
16	Hard Valve	Flowmatics	MBL-715-19	NA	1-inch
17	Flowmeter	Fisher–Porter	NA	200595-E	0–to 100-sccm ±5% accuracy
18	Hand Valve	Flowmatics	MBL-715-19	NA	1-inch

Table 4-2. Functional Test Data

Test Media	LN_2
Pressure	150-psig
Leakage:	
Internal	None
Packing Gland	None

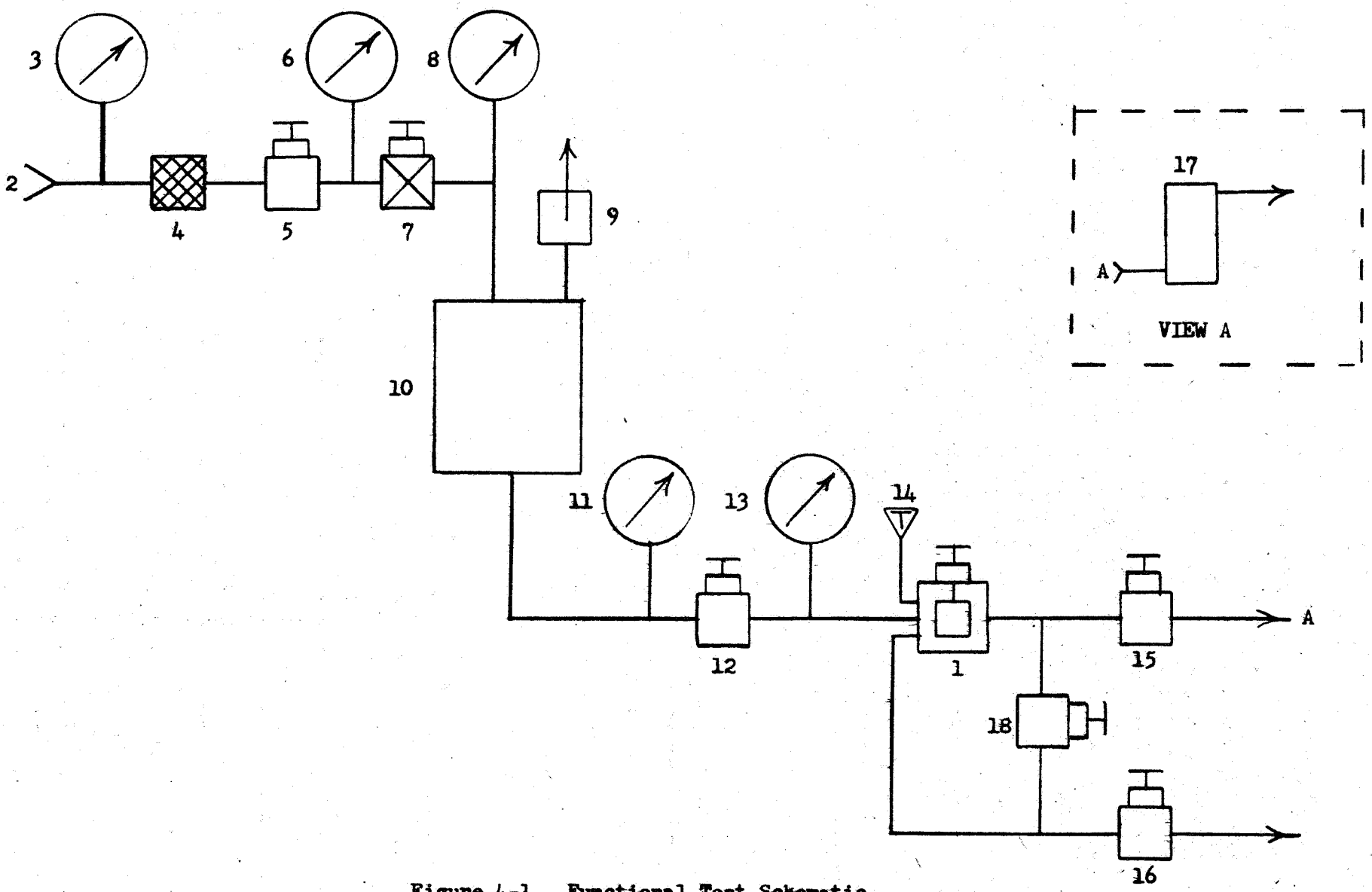


Figure 4-1. Functional Test Schematic

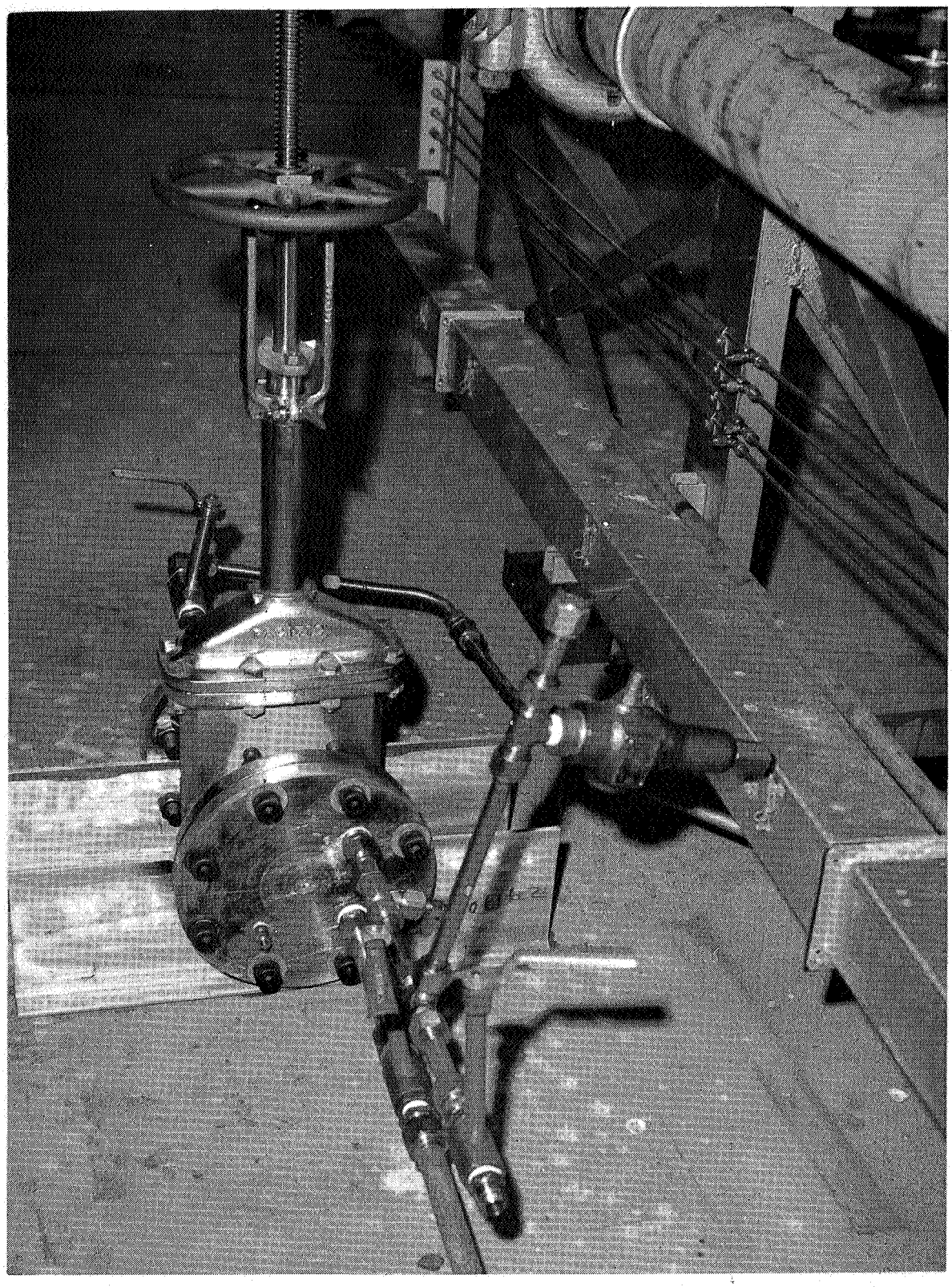


Figure 4-2. Functional Test Setup

SECTION V

HIGH TEMPERATURE TEST

5.1 TEST REQUIREMENTS

5.1.1 A high temperature test shall be performed on the specimen test to determine whether the environment causes degradation or deformation.

5.1.2 The rated high temperature is 125 (+4, -0) °F.

5.1.3 A functional test shall be performed during this test, using LN_2 as the test medium.

5.2 TEST PROCEDURE

5.2.1 The test specimen was placed in a high temperature chamber and installed as shown in figure 4-1 (view A) using the equipment shown in tables 4-1 and 5-1.

5.2.2 The chamber was controlled to the specified test conditions of 125(+4,-0) F by maintaining a relative humidity of 20($\pm$5) percent.

5.2.3 This temperature was maintained for a period of 72 (+2, -0) hours.

5.2.4 A functional test was conducted while the chamber temperature was maintained.

5.2.5 The chamber temperature was returned to ambient conditions upon completion of the functional test.

5.2.6 The test specimen was visually inspected and functionally tested within 1 hour following the establishment of ambient conditions.

5.2.7 The test data were recorded.

5.3 TEST RESULTS

The test specimen successfully met the requirements of the high temperature test. No leakage was noted.

5.4 TEST DATA

The data presented in tables 5-2 and 5-3 were recorded during the high temperature test.

Table 5-1. High Temperature Test Equipment List

Item No.	Item	Manufacturer	Model/ Part No.	Serial No.	Remarks
1	Temperature Power Supply	Thermotron Corp.	NA	200507	-100 to + 400°F Cal date 9-1-66
2	Temperature Recorder	Honeywell	NA	64071099	-300 to + 400°F Cal date 10-21-66

Table 5-2. Functional Test Data Obtained During High Temperature Test

Temperature	+125°F
Test Media	LN_2
Pressure	150 psig
Leakage:	
Internal	None
Packing Gland	None

Table 5-3. Functional Test Data Obtained After High Temperature Test

Temperature	Ambient
Test Media	LN_2
Pressure	150 psig
Leakage:	
Internal	None
Packing Gland	None

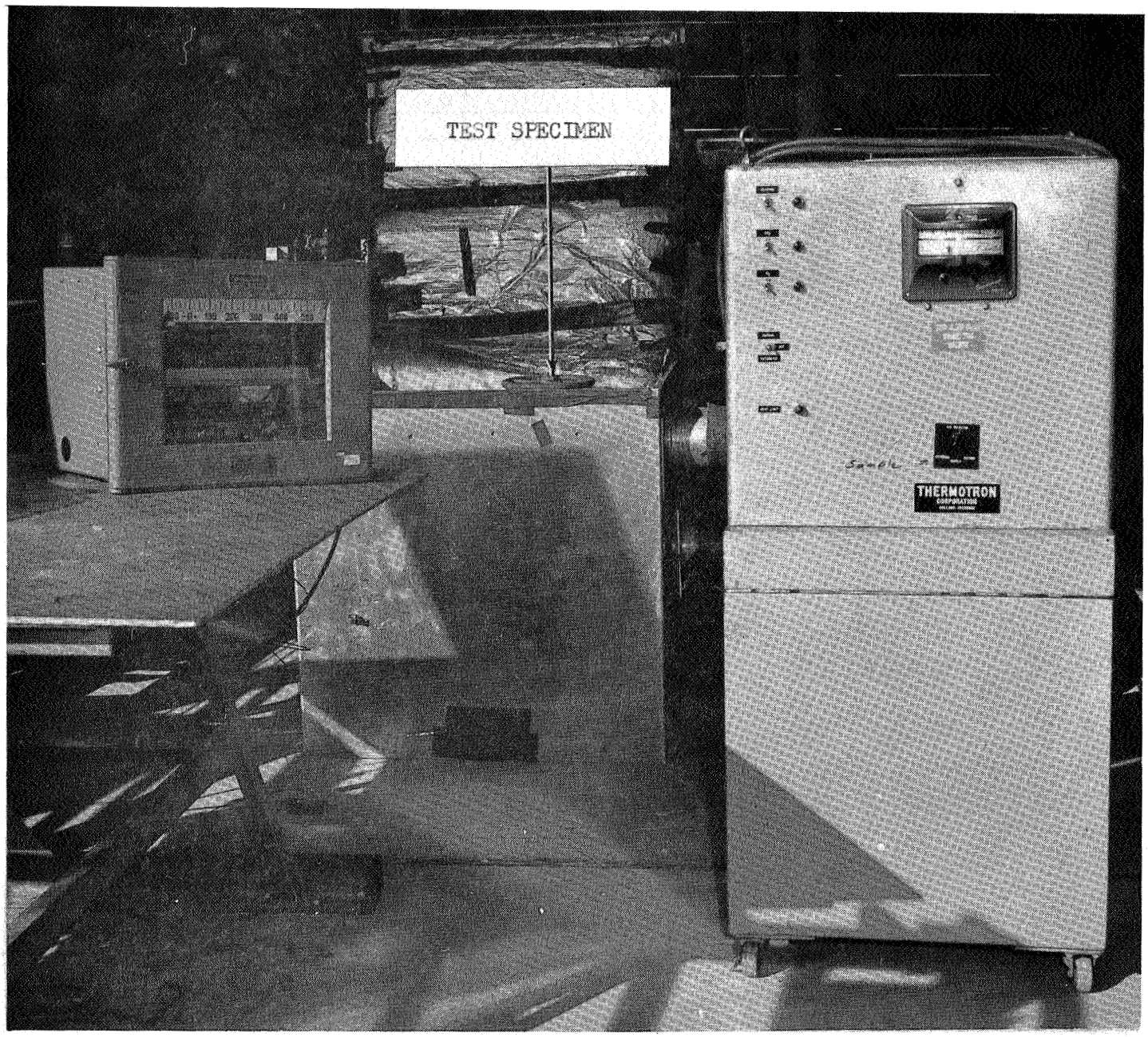


Figure 5-1. High Temperature Test Setup

APPROVAL

TEST REPORT

FOH

GATE VALVE, MANUALLY OPERATED

6-INCH, 150-POUND

Pacific Valve Company Part Number S8550F(8)-12T-ASA

NASA Drawing number 75M12930 LGV-IB

SUBMITTED BY:

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